Remarks

Status of the Claims

Claims 1 – 24 were original in the application and have issued in the parent application. Claims 1 – 24 are set forth subject to terminal disclaimer to be confirmed over the art cited below. Claims 25 – 40 are added and are also distinguished over the art.

The Information Disclosure Statement

Larson et.al., *"Advances in Atom Probe Specimen Fabrication from Planar Multilayer Thin Film Structures,"* Microsc. Microanal. 7, 24 - 31 (2001) describes a similar process to **Martens** for the formation of posts in a wafer, namely the formation of high aspect ratio, flat-topped Si "posts" as the starting point by lithographic patterning. Standard optical lithography and reactive ion etching processes were used to pattern the thermally-oxidized Si wafers. After patterning, deep-trench reactive ion etching was used to create Si posts having a high aspect ratio (up to ~50 to 1). Deep-trench reactive ion etching is a standard process referred to as the **"Bosch"** process and is an adaptation of existing plasma processing techniques to the microfabrication of Si.

In order for this to be a viable process, both high etch rate and large anisotropy are required. A high etch rate can be achieved by utilizing a fluorine-rich plasma (e.g., SF6). However, such a process has extremely poor anisotropy. These conflicting requirements are resolved by using a time-multiplexed

technique that cycles between etching and deposition of an etch-inhibiting film. During the deposition cycle, a fluorocarbon film is deposited. During the subsequent etching cycle, this film is preferentially removed from the horizontal surfaces by ion bombardment, allowing etching of the exposed Si at the bottom of the trenches. At the same time, the fluorocarbon remains on the sidewalls, preventing any etching in the lateral direction. This process can be repeated for hundreds of cycles (with a cycle time ~10–20 sec) until the desired trench depth is reached. After the posts are created, the wafers are then etched (typically in HF) to remove any remaining oxide mask.

The posts are removed from the wafer by mechanically fracturing them near their base using a knife, or other sharp implement, and deposited onto a glass slide. Many posts do not survive this process, but loss in yield is accepted because of the large number of posts contained on the wafer.

Martens et.al., *"Preparation of 3D Atom Probe Samples of Multlayered Film Structures Using a Focused Ion Beam,"* Microsc. Microanal. 6, (Suppl. 2:Proceedings 2000) describes a silicon wafer etched with the "**Bosch**" process to produce a surface that contains millions of 20, 16, 12, 8, and 4 μm square by about 180 μm long "posts", which are shown in the microphotograph of Fig. 1 appearing as "straw" piled to the right of the substrate. These posts are then FIB processed.

Larson et.al., *"Three-Dimensional Atom Probe Field-Ion Microscopy of Cu/Co Multilayer Film Structures,"* Appl. Phys. Lett. 73, 1125 – 1127 (1998) is virtually silent with respect to the fabrication of the posts from which the probe is

made, but discloses in a three-word phrase fabrication of the post using a "pattern by photolithography", namely masking and chemically etching. A probe is made out of the post using FIB.

Larson et.al., *"Focused Ion-Beam Specimen Preparation for Atom Probe Field Ion Microscopy Characterization of Multilayer Film Structures,"* Nanotech. 10, 45 – 50 (1999) fails to disclose how the posts were fabricated, but only discusses subsequent FIB milling steps.

Ishikawa et.al. Japanese Published Application H743373 (1995) describes in Fig. 2 forming tips in a slab by means of a mechanical cutter 22 used to make lateral and longitudinal cuts. The cutter 22 is characterized by a relief angle so that the tips are not prismatic, but rather pyramidal. The nature of cutter 22 is not disclosed, but it is shown in cross-section as a wheel grinder, i.e. cuts by means of abrasion.

Kelly '121 discloses in connection with FIG. 9(b), that spaces 910 between the protrusions 908 are filled in with a filler material 912 to provide a uniform planar top surface on the study specimen 902. **Kelly '121** fabricates the posts using focused ion beam (FIB) milling or etching. The filler material 912 is a sacrificial layer which will be removed after the study specimen 902 is subjected to the layer deposition process, and it may be formed of polymers, solders, evaporated metals, or other materials. The base layer of the filler material 912 may be formed of a material which does not strongly adhere to the study specimen 902, and subsequent layers may then be chosen to facilitate the removal of the entirety of the sacrificial filler material 912 by later magnetic

removal of the filler material 912. Alternatively, certain polymers or alloys could be chosen for combination as filler material 912, and for ready removal by a combination of irradiation or heating combined with suction, or by application of ultrasonic energy.

The use of filler material to assist the formation of a plurality of posts during a sawing process is not suggested in or motivated by **Kelly '121**. The use of filler material in **Kelly '121** is for the purpose of forming a later deposition layer on the ends of the already formed tips.

Note that **Kelly '121** has the identical specification as **Kelly '900** claiming priority to a 2000 provisional application, which was cited during the prosecution of the application and over which the original claims were found allowable.

In conformity with 37 CFR 1.97(h) the filing of an information disclosure statement and its contents, including the foregoing characterizations of the cited references, is not intended to be and shall not be construed to be an admission that the information cited in the statement is, or is considered to be, material to patentability as defined in 37 CFR 1.56(b). Nor should it be understood that the claims have been amended because of any one or more of the cited references, which have not been applied to any of the claims at any time. The claims are simply being presented anew with better focus of mind as if being presented for

the first time. The amended claims are intended to be presented afresh without any explicit or implicit specific reference to any of the cited references.

Advancement of the claims as amended to allowance is respectfully requested.

Respectfully submitted,

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